AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended): A spread spectrum communication system including a transmitter and receiver for performing spread spectrum communications based on a direct sequence spreading scheme,

the transmitter comprising:

a complex spreading ~~spread~~ portion for multiplying an I-phase component signal and a Q-phase component signal of a ~~the~~ transmission signal by a ~~one type of~~ complex number sequence which will not cause any phase transition of signals ~~a signal~~ on an ~~the~~ I-Q plane in a ~~the~~ direction toward the origin thereof;

a multiplier for multiplying ~~the~~ signals output from the complex spreading portion by a pseudo-random sequence which is generated at a speed exceeding a ~~the~~ symbol rate of the transmission signal;

a roll-off filter for waveform shaping; and

a carrier modulator for performing carrier modulation of ~~the~~ signals having undergone waveform shaping,

the receiver comprising:

a carrier demodulator for performing carrier demodulation of a ~~the received~~ signal received from the transmitter;

a multiplier for multiplying ~~the two types of~~ signals of two types output from the carrier demodulator by the pseudo-random sequence ~~generated at the same speed as above~~;

a complex despreading portion for performing despreading by multiplying the signals of each type ~~type of signal~~ by the complex number sequence; and

a phase-correcting portion for performing phase-correction so as to extract the I-phase and Q-phase components,

wherein the complex number sequence is a pattern by which the I-phase component is constantly set at 1 or -1 and the Q-phase component changes between 1 and -1 alternately.

Claim 2 (Currently Amended): The spectrum spread communication system according to Claim 1, wherein the complex spreading portion includes:

a multiplier for multiplying the I-phase component signal and the Q-phase component signal of the transmission signal by the complex number sequence, and

an adder for performing addition of the I-phase component signal and the Q-phase component signal of the transmission signal respectively to the Q-phase component signal and the I-phase component signal multiplied by the complex number sequence; and

the complex despreading portion ~~wherein the complex despreading portion performs the despreading~~ includes:

a multiplier for multiplying the signals of each type by the complex number sequence, and

an adder for performing addition of the signals of each type to the signals of each type multiplied by the complex number sequence, respectively.

Claim 3 (Canceled).

Claim 4 (Currently Amended): The spectrum spread communication system according to Claim 1, further comprising:

a mapping circuit disposed prior to the transmitter for mapping data input thereto ~~the multiplexed transmission signals~~ to points on the I-Q plane.

Claim 5 (Currently Amended): A spread spectrum communication system including a transmitter and receiver for performing spread spectrum communications based on a direct sequence spreading scheme,

the transmitter comprising:

a permuting processor for permuting an ~~the~~ I-phase component signal and a ~~the~~ Q-phase component signal of a ~~the~~ transmission signal[[,]] once every two clock units and, at the same time, inverting the sign of one of the I-phase and Q-phase component signals;

a multiplier for multiplying ~~the~~ signals output from the permuting processor ~~complex spreading portion~~ by a pseudo-random sequence which is generated at a speed exceeding a ~~the~~ symbol rate of the transmission signal;

a roll-off filter for waveform shaping; and

a carrier modulator for performing carrier modulation of ~~the~~ signals having undergone waveform shaping,

the receiver comprising:

a carrier demodulator for performing carrier demodulation of a ~~the~~ received signal;

a multiplier for multiplying ~~the~~ two types of signals output from the carrier demodulator by the pseudo-random sequence ~~generated at the same speed as above~~;

a permuting processor for permuting a signal corresponding to the I-phase component signal multiplied by the pseudo-random sequence[[,]] once every two clock units and, at the

same time, inverting the sign of a signal corresponding to the component signal which underwent sign inversion at the transmitter; and

a phase-correcting portion for performing phase-correction so as to extract the I-phase and Q-phase component signals ~~components~~.

Claim 6 (Currently Amended): The spectrum spread communication system according to Claim 5, wherein the permuting processor of the transmitter includes:

a multiplier for multiplying one of the component signals of the transmission signal by –1; and

a switch which, based on a control signal of 1 and 0 appearing alternately, switches between a ~~the~~ combination of the I-phase component signal and the Q-phase component signal of the transmission signal and a ~~the~~ combination of the one component signal multiplied by –1 and the other component signal,

the permuting ~~inverse~~ processor of the receiver includes:

a multiplier for multiplying the signal which was multiplied by the pseudo-random sequence by –1;

a switch which, based on a control signal of 1 and 0 appearing alternately, switches between a ~~the~~ combination of the signals which were multiplied by the [[a]] pseudo-random sequence and a ~~the~~ combination of the one ~~between the~~ signal multiplied by –1 and the other signal multiplied by the ~~another~~ pseudo-random sequence.

Claim 7 (Currently Amended): The spectrum spread communication system according to Claim 5, further comprising:

a mapping circuit disposed prior to the transmitter for mapping data input thereto ~~the multiplexed transmission signals~~ to points on the I-Q plane.

Claim 8 (Currently Amended): The spectrum spread communication system according to Claim 7, wherein the mapping circuit maps the data ~~each of the signals~~ to the I-phase and Q-phase and independently sets the I-phase or Q-phase amplitude and the symbol rate, if required.

Claim 9 (Currently Amended): The spectrum spread communication system according to Claim 7, wherein the mapping circuit has the mapping function of mapping, when a multiple number of data channels are needed to be allotted in response to an information transfer request arising regularly or eventually, the data onto the I-Q plane by using a multiple number of orthogonal sequences, whereby increase in symbol rate due to mapping is minimized.

Claim 10 (New): The spread spectrum communication system according to Claim 1, wherein the pattern is represented by $1 + (-1)^k j$ or $-1 + (-1)^k j$ ($k = 0, 1, 2, \ldots$, j is the imaginary unit).

Claim 11 (New): A spread spectrum communication apparatus for performing spread spectrum communications based on a direct spreading scheme, comprising:

a complex spreading portion for multiplying an I-phase component signal and a Q-phase component signal of a transmission signal by a complex number sequence;

a multiplier for multiplying the signals output from the complex spreading portion by a pseudo-random sequence which is generated at a speed exceeding a symbol rate of the transmission signal;

a roll-off filter for waveform shaping; and

a carrier modulator for performing carrier modulation of signals having undergone waveform shaping,

wherein the complex number sequence is a pattern by which the I-phase component is constantly set at 1 or -1 and the Q-phase component changes between 1 and -1 alternately.

Claim 12 (New): The spread spectrum communication apparatus according to Claim 11, wherein the complex spreading portion includes:

a multiplier for multiplying the I-phase component signal and the Q-phase component signal of the transmission signal by the complex number sequence, and

an adder for performing addition of the I-phase component signal and the Q-phase component signal of the transmission signal respectively to the Q-phase component signal and the I-phase component signal multiplied by the complex number sequence.

Claim 13 (New): The spread spectrum communication apparatus according to Claim 11, wherein the pattern is represented by $1 + (-1)^k j$ or $-1 + (-1)^k j$ ($k = 0, 1, 2, \ldots$, j is the imaginary unit).

Claim 14 (New): The spread spectrum communication apparatus according to Claim 11, further comprising:

a mapping circuit disposed prior to the complex spreading portion for mapping data input thereto to points on the I-Q plane.

Claim 15 (New): A spread spectrum communication apparatus for performing spread spectrum communications based on a direct sequence spreading scheme, comprising:

a permuting processor for permuting an I-phase component signal and a Q-phase component signal of a transmission signal once every two clock units and, at the same time, inverting the sign of one of the I-phase and Q-phase component signals;

a multiplier for multiplying signals output from the permuting processor by a pseudo-random sequence which is generated at a speed exceeding a symbol rate of the transmission signal;

a roll-off filter for waveform shaping; and

a carrier modulator for performing carrier modulation of signals having undergone waveform shaping.

Claim 16 (New): The spread spectrum communication apparatus according to Claim 15, wherein the permuting processor includes:

a multiplier for multiplying the one of the I-phase and Q-phase component signals of the transmission signal by -1; and

a switch which, based on a control signal of 1 and 0 appearing alternately, switches between a combination of the I-phase component signal and the Q-phase component signal of the transmission signal and a combination of the one component signal multiplied by -1 and the other component signal.

Claim 17 (New): The spread spectrum communication apparatus according to Claim 15, further comprising:

a mapping circuit disposed prior to the permuting processor for mapping data input thereto to points on the I-Q plane.

Claim 18 (New): The spread spectrum communication apparatus according to Claim 17, wherein the mapping circuit maps the data to the I-phase and Q-phase and independently sets the I-phase and Q-phase amplitude and the symbol rate, if required.

Claim 19 (New): The spread spectrum communication apparatus according to claim 17, wherein the mapping circuit has the mapping function of mapping, when a multiple number of data channels are needed to be allotted in response to an information transfer request arising regularly or eventually, the data onto the I-Q plane by using a multiple number of orthogonal sequences whereby increase in symbol rate due to mapping is minimized.

Claim 20 (New): A spread spectrum communication apparatus for performing spread spectrum communications based on a direct sequence spreading scheme, comprising:

a carrier demodulator for performing carrier demodulation of a received signal;

a multiplier for multiplying signals of two types output from the carrier demodulator by a pseudo-random sequence generated at a speed exceeding a symbol rate of the received signal;

a complex despreading portion for performing despreading by multiplying the signals of each type by a complex number sequence; and

a phase-correcting portion for performing phase-correction so as to extract I-phase and Q-phase components,

wherein the complex number sequence is a pattern by which the I-phase component is constantly set at 1 or -1 and the Q-phase component changes between 1 and -1 alternately.

Claim 21 (New): The spread spectrum communication apparatus according to Claim 20, wherein the complex despreading portion includes:

a multiplier for multiplying the signals of each type by the complex number sequence, and

an adder for performing addition of the signals of each type to the signals of each type multiplied by the complex number sequence, respectively.

Claim 22 (New): The spread spectrum communication apparatus according to Claim 20, wherein the pattern is represented by $1 + (-1)^k j$ or $-1 + (-1)^k j$ ($k = 0, 1, 2, \ldots$, j is the imaginary unit).

Claim 23 (New): A spread spectrum communication apparatus for performing spread spectrum communications based on a direct sequence spreading scheme, comprising:

a carrier demodulator for performing carrier demodulation of a received signal;

a multiplier for multiplying two types of signals output from the carrier demodulator by a pseudo-random sequence generated at a speed exceeding a symbol rate of the received signal;

a permuting processor for permuting the two types of signals multiplied by the pseudo-random sequence once every two clock units and, at the same time, inverting the sign of one of the two types of signals; and

a phase-correcting portion for performing phase-correction so as to extract I-phase and Q-phase component signals.

Claim 24 (New): The spread spectrum communication apparatus according to Claim 23, wherein the permuting processor includes:

a multiplier for multiplying the one of the two types of signals by -1;

a switch which, based on a control signal of 1 and 0 appearing alternately, switches between a combination of the two types of signals which were multiplied by the pseudo-random sequence and a combination of the one signal multiplied by -1 and the other signal multiplied by the pseudo-random sequence.